Following are pertinent goals addressed in the Malheur National Forest Noxious Weed Management Plan:

Goal No. 1	Cooperate in control of plants identified as pests by Oregon Department of Agriculture and local weed control districts.
Goal No. 2:	Coordinate control programs with State and Grant, Harney, Baker, and Malheur County control agencies.
Goal No. 3:	Identify, by species, the priority for control
Goal No 4	Finance the noxious weed program through multifunctional funding

D Management of the Affected Resources

In this Section of the chapter, current management of the Forest's resources is described, along with anticipated use levels More information about supply and demand of specific resources is available in the "Management Situation Summary Chapter" of the accompanying Forest Plan The general interactions of resource management on this Forest are also discussed here Resource interactions are the basis of alternative effects described in Chapter IV

1 Timber

When people think of a forest, they think of trees Forested land is important for wildlife habitat and provides beautiful scenery. Forests provide a setting for a variety of recreational activities Trees are also important to the economic well-being of local communities and play a role in Regional and National economics as well.

There are three important types of commercial timber on the Forest ponderosa pine, mixed conifer, and lodgepole pine Table III-1 gives information about successional stages for these three types (Successional stages for both forested and nonforested lands are illustrated in Figure III-3) As Table III-1 indicates, the typical stand of trees on the Forest today is a two-storied stand which can be found in three different successional stages mature, young, and pole-sapling The overstory consists of large, mature trees, while the understory contains a variety of tree species of various ages

An immediate effect of timber harvest is an increase in age-class diversity as the abundance of two-storied stands and mature trees are converted to early successional stages. But as this trend continues, diversity decreases because the Forest will have an abundance of early to mid-successional stages

TABLE III-1: Available and Suitable Timber Inventory by Species Group (1980).

Species Group	Thousands of Acres	Million cubic feet	Million board feet 1/
Ponderosa Pine:			
Regeneration	4.5		
Seed and sapling	0.7		
Immature sawtimber	68.4	75 2	384 1
Two-story stands	232 8	326 2	1,888 9
Mature sawtimber	19 7	34 4	203 2
TOTAL	326 1	435.8	2,476 2
Mixed Conifer.			
Regeneration	5 0		
Seed and sapling	0.1		
Immature sawtimber	69 6	96 7	519 7
Two-story stands	530 2	1,195.6	6,970 0
Mature sawtimber	21.1	46.1	262 2
TOTAL	626.0	1,338 4	7,751.9
Lodgepole Pine:			
Regeneration	25 8		
Seed and sapling	1 4		
Immature sawtimber	19.2	13 2	72.9
Two-story stands	14 9	17 5	96.9
Mature sawtimber	2 3	2.6	14 1
TOTAL	63 6	33.3	183 9
Low Sites: 2/	24 2	22 8	129.3
TOTAL	1,039.9	1,830.3	10,541 3

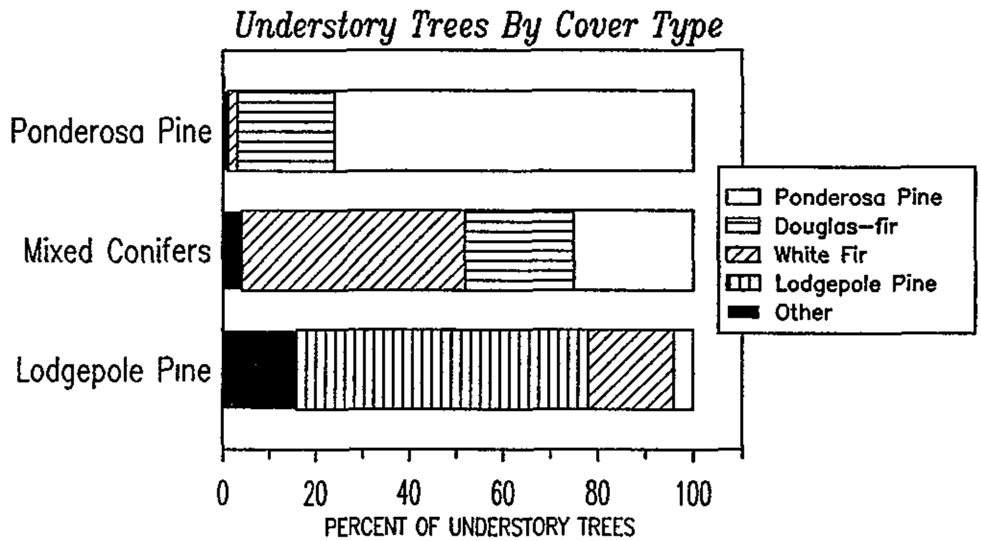
1/ Based on live trees 9-inches DBH and larger to a 6-inch top diameter (Regional Office empirical yield table values, updated to 1987 volumes)

2/ Low-site volumes are based on low-site ponderosa pine yields from Ochoco N F

Figure III-7 displays the typical understory species composition for the three major forest types. What is not readily apparent in figure III-7 is a recent change in forest types (see figure III-4 for type change information)

For existing ponderosa pine stands, ponderosa pine represents about 70 percent of the overstory composition, but it has recently comprised about 90 percent of the timber volume harvested This is because ponderosa pines are currently the largest overstory trees. As the understory is managed in the future, the mixed- conifer species will make up more of the volume harvested Mixed-conifer species represent roughly one fourth of the trees in the understory, and they have the highest potential growth rate Once these stands are regenerated, the overall species mix will be about 83 percent ponderosa pine, with the actual harvest volume being about 90 percent ponderosa pine over the length of the rotation.

Figure III-7: Understory Tree Composition by Forest Type 1/



1/ Based on the number of trees, by species, less than 14 inches DBH in the understory of a typical stand for each of the three major forest types

On mixed-conifer sites, ponderosa pine is about 20 percent of the overstory but it has contributed about 50 percent of the volume harvested This occurred because ponderosa pines are the largest trees available for harvest and they are preferred by the wood products industry In the future, mixed-conifer species will make up more of the harvest volume because they have faster growth Once mixed-conifer stands are regenerated, the overall species mix will be about 25 percent ponderosa pine, with the actual harvest volume being about 36 percent ponderosa pine over a rotation This effect from mixed-conifer stands is even more significant because they cover the majority of the Forest's acreage (see Table III-1)

This means that as the overstory is removed from mixed-conifer stands, the relative proportion of ponderosa pine available for harvest or habitat is reduced While the total volume of wood fiber will still be available, the species mix and size of trees will have changed Although it varies by alternative, a general trend is that ponderosa pine volume will first decrease from about 50 percent in the first decade to 35 percent in the fourth decade, then increase to 60 to 70 percent again after the tenth decade Harvest diameters will decrease from 24 inches to 16 inches by the fifteenth decade These changes reflect harvest preferences for ponderosa pine and historic fire suppression

The change in forest types from ponderosa pine to mixed conifers is accompanied by increased susceptibility to insects and diseases. These pests are not new to the Forest, but as their host type increases, their severity could also increase.

a. *Land Classification*

The Malheur National Forest produces resources from a land base of 1,459,422 acres, 1,174,878 acres are forested and 1,039,868 acres have been identified as tentatively suitable for timber production. The results of this classification process are shown in Table III-2

Current management direction for the Malheur National Forest is derived from three Unit Plans (John Day Unit, Silvies-Malheur Unit, and South Fork Unit) and the existing Timber Resource Management Plan These four management plans provide resource management objectives for the Forest The Timber Resource Management Plan (1979) provides specific direction for achieving the greatest volume of wood fiber from available lands, on a continuing basis, within the guidelines of the three unit plans

A variety of silvicultural techniques for harvesting, timber stand improvement, commercial thinning, and reforestation are combined with other management objectives to achieve the resource objectives for a specific project or area. The way in which timber resources are currently being managed is described in the No Action Alternative (see discussion of alternative A in chapter II)

b *Pest Management*

Insects and diseases are a natural part of the forest environment. They cause change in the forest, primarily by thinning stands and recycling nutrients Insects and diseases are usually found at endemic (low) levels, which have little adverse impact on healthy trees. But once a tree becomes stressed by drought, old age, or physical damage, an insect or disease pest can easily kill it. Whenever stress conditions affect large areas, insect or disease populations can expand until they are out of control, a condition called an "epidemic" Two recent examples are the 1972-1978 mountain pine beetle epidemic in lodgepole pine, and the 1980-1989 western spruce budworm epidemic in mixed-conifer stands.

Dead trees provide homes for birds, insects, and other animals The insects themselves are a food source for birds and mammals It is often overlooked that some bird species exert significant control on insect populations Recent research indicates that birds can reduce budworm populations by as much as 72 percent in a single summer (Langelier and Garton 1986). The following birds occur on the Malheur National Forest and are effective at regulating budworm levels

American Robin	Golden-Crowned Kinglet	Swainson's Thrush
Cassin's Finch	Hammond's Flycatcher	Townsend's Warbler
Chipping Sparrow	Mountain Chickadee	Western Tanager
Dark-eyed Junco	Pine Siskin	Yellow-rumped Warbler
Evening Grosbeak	Red-breasted Nuthatch	

The western spruce budworm is a defoliator found in Douglas-fir, white fir, and grand fir stands throughout the west In 1980, spruce budworm populations began building throughout eastern Oregon. By 1986, budworm populations were at epidemic levels throughout the Blue Mountains, despite repeated attempts to control it with both chemical and viral insecticides

TABLE III-2: Land Suitability for Timber Production

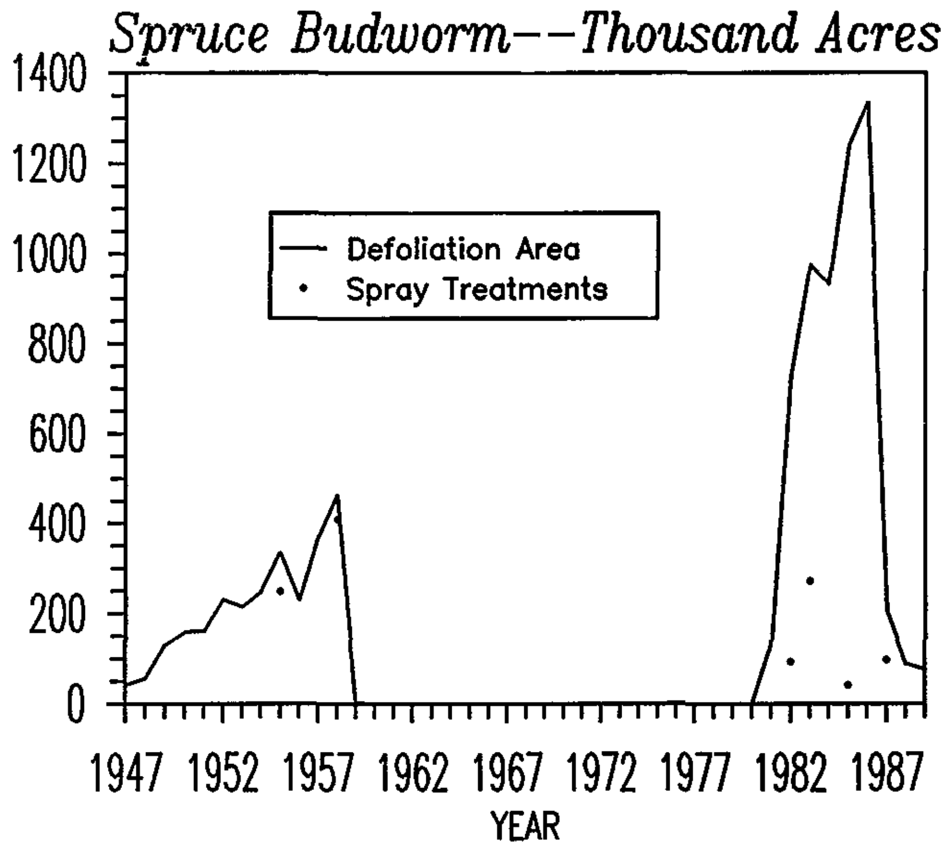
	Acres Not Suited For Timber Production	Total Acres
I. Total National Forest Area		1,540,119
A. Other Ownerships	80,690	
II Net National Forest Area		1,459,422
A Water	3,052	
B Nonforest (not stocked with 10 percent tree cover)	254,398	
C Lands developed for other than timber production purposes (crops, improved pasture, residential, administrative areas, improved roads, powerline clearings)	27,094	
III. Forested Lands		1,174,878
A. Withdrawn from scheduled timber production		
1 Wilderness	66,226	
2 Research Natural Areas	0	
3 Other (e g, Wild & Scenic Rivers, Experimental Forests)	2,147	
SUBTOTAL	68,373	
B Lands growing less than 20 cubic feet/acre/year		
1 Lands classified unsuitable	50,596 1/	
2. Lands classified suitable		(24,307) 2/
3. Lands classified separate suitability component	0	
SUBTOTAL	50,596	
C. Irreversible resource damage	0	
D. Regeneration Difficulty		16,041
E. Regeneration Difficulty (classified as a separate suitability component)	0	
IV. Forested Lands Not Suitable for Timber Production	135,010	
V. Lands Tentatively Suitable for Timber Production		1,039,868
VI Total National Forest Lands Not Suitable for Timber Production	419,554	
VII. Land Status Under Current Timber Management Plan	257,040	1,200,985
	Noncommercial Forest Land	Commercial Forest Land

1/ Lands producing less than 20 cubic feet/acre/year, unsuitable because of regeneration difficulty

2/ Lands producing less than 20 cubic feet/acre/year that are suitable for production.

Figure III-8 provides a history of budworm outbreaks on the Forest, and spray treatments completed during attempts to control it. Figure III-8 shows that the 1980-1989 epidemic did not last quite as long as the 1946-1959 outbreak, but it affected considerably more area and was much more severe

FIGURE III-8: Western Spruce Budworm History, Malheur National Forest

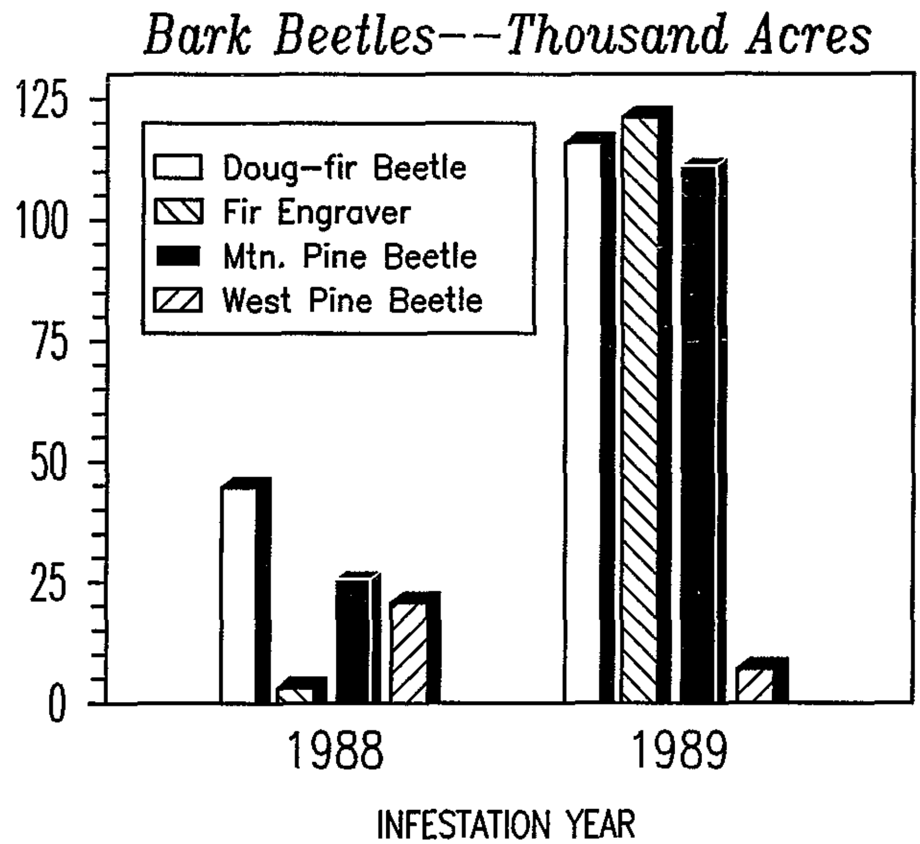


A Douglas-fir tussock moth outbreak occurred on the Burns Ranger District from 1963 to 1965, where it affected 65,000 acres before being controlled with a chemical insecticide Future tussock-moth outbreaks are likely because of an increasing amount of white fir and Douglas-fir host type on the Forest

The Douglas-fir tussock moth and western spruce budworm will remain a serious threat if the Forest continues to favor mixed-conifer stands by removing ponderosa pine overstories and managing the fir understories The potential for future damage from these defoliators may gradually decline as more fir stands are intensively managed (Brookes 1985)

In 1988, a major increase in bark beetle problems began on the Forest Mountain pine beetle was active in both lodgepole pine and ponderosa pine stands, especially those weakened by a 1985-1988 drought in the Blue Mountains. Douglas-fir beetles and fir engravers were causing widespread mortality in mixed-conifer stands, particularly those damaged by the 1980-1989 budworm epidemic Figure III-9 shows major bark beetle infestations in 1988 and 1989

FIGURE III-9: 1988-1989 Bark Beetle Infestations, Malheur National Forest



Surveys conducted on the Fremont and Ochoco National Forests (Buffam 1985) in south-eastern Oregon showed that root diseases are causing serious losses in the true fir types While no widespread surveys have been conducted, project-level analyses show that the same root diseases are causing damage here on the Malheur National Forest

Stem decays, especially Indian paint fungus, are quite damaging in true-fir stands on the Forest (Burns 1983) Dwarf-mistletoe infections also occur in Douglas-fir, pine, and western larch Damage is most severe in Douglas-fir stands, with almost half of those stands infected (Hadfield 1984, Twardus et al , 1984). Table III-3 provides information about important insect and disease pests of the Forest

Pocket gophers and porcupines are two animals that damage trees They cause the most damage in tree plantations Pocket gophers destroy newly-planted seedlings by eating their juicy, young roots They prefer the robust root systems of nursery-grown trees Porcupines kill or damage young trees by chewing the bark on their trunk Activity by these animals can destroy a plantation or produce a large number of deformed trees

TABLE III-3: *Important Forest Pests of the Malheur National Forest*

*** BARK BEETLES ***

Douglas-fir Beetle (*Dendroctonus pseudotsugae*)
TREES AFFECTED Douglas-fir and western larch.
DAMAGE CAUSED Tree mortality
IMPACTS AND EFFECTS: Attacks trees weakened by disease, drought, defoliation, fire or other stress, very active after the 1980-1989 budworm epidemic and the 1985-1988 drought, affecting 44,600 acres in 1988 and 115,888 acres in 1989.
CONTROL MEASURES: Salvage attacked and susceptible hosts, manage green slash to prevent population buildups.

Fir Engraver Beetles (*Scolytus ventralis*).
TREES AFFECTED· White fir and subalpine fir
DAMAGE CAUSED· Top-kill and tree mortality.
IMPACTS AND EFFECTS. Attacks trees weakened by drought, defoliation and root disease; very active after the 1980-1989 spruce budworm epidemic and the 1985-1988 drought, affecting 3,190 acres in 1988 and 121,088 acres in 1989.
CONTROL MEASURES Improve host vigor, treat root diseases and other stressful agents over which we have some control, salvage damaged and susceptible hosts

Mountain Pine Beetle (*Dendroctonus ponderosae*)
TREES AFFECTED Lodgepole pine and ponderosa pine.
DAMAGE CAUSED: Tree mortality, blue-staining of sapwood.
IMPACTS AND EFFECTS. Killed millions of lodgepole pines in the Blue Mountains from 1972-1978, very active after the 1985-1988 drought in both lodgepole and ponderosa pine types–affected 25,580 acres in 1988 and 111,057 acres in 1989.
CONTROL MEASURES Stocking-level control, chemical insecticides or attractants (pheromones) are occasionally used

Pine Engraver Beetles (*Ips* spp)
TREES AFFECTED. Ponderosa pine and lodgepole pine.
DAMAGE CAUSED Top-kill and tree mortality.
IMPACTS AND EFFECTS. Populations build in slash and then attack living trees. May escape from thinning slash to kill leave trees in thinning units.
CONTROL MEASURES· Create enough green slash to prevent killing of leave trees

Western Pine Beetle (*Dendroctonus brevicomis*)
TREE AFFECTED Ponderosa pine
DAMAGE CAUSED. Tree mortality, blue-staining of sapwood.
IMPACTS AND EFFECTS Attacks stressed, high-risk trees, fairly active after the 1985-1988 drought, affecting 9,770 acres in 1988 and 5,721 acres in 1989
CONTROL MEASURES Sanitation and salvage, stocking-level control; replace old-growth with young, vigorous trees.

*** DEFOLIATORS ***

Douglas-fir Tussock Moth (*Orgyia pseudotsugata*)
TREES AFFECTED White fir and Douglas-fir
DAMAGE CAUSED: Severe top-kill; reduced radial growth; tree mortality.
IMPACTS AND EFFECTS Cyclic–recorded outbreaks occurred in 1928-29 (Seneca), 1937-39 (80,000 acres near Rudio Mountain), 1947-48 (1,500 acres near Snow Mountain and Gold Hill), 1963-65 (Antelope Mountain and King Mountain), and 1973 (1,200

acres near Ironside, just east of the Malheur NF) The 1963-65 epidemic affected almost 65,000 acres before being suppressed with DDT.
CONTROL MEASURES Spray with insecticides, favor non-host species and mosaics of host and non-host stands.

Larch Casebearer (*Coleophora laricella*)
TREE AFFECTED· Western larch
DAMAGE CAUSED Defoliation, growth reduction, branch die-back, tree mortality.
IMPACTS AND EFFECTS Sporadic Generally affects small areas at one time, but damages can be severe in infested stands
CONTROL MEASURES. Chemical insecticide for individual trees; natural parasites are also effective for large areas

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Western Spruce Budworm (*Choristoneura occidentalis*)
TREES AFFECTED White fir, Douglas-fir, subalpine fir, and Engelmann spruce
DAMAGE CAUSED Reduces radial and height growth and seed production, prolonged defoliation will kill trees
IMPACTS AND EFFECTS Cyclic epidemics are common – Malheur NF most recently affected from 1945-1959 (463,500 acres), and 1980-1989 (1 34 million acres)
CONTROL MEASURES Spray with insecticides, favor seral, non-host trees during stand management, create single-story stands when dealing with pure host type, create host/non-host mosaics over large areas Parts of the recent Malheur NF epidemic were sprayed with carbaryl or b t. in 1982, 1983, 1985 and 1987

*** DWARF-MISTLETOES ***

Douglas-fir Dwarf-Mistletoe (*Arceuthobium douglasii*)
TREE AFFECTED Douglas-fir
DAMAGE CAUSED Top-kill, reduced growth, deformed stems, brooms; mortality
IMPACTS AND EFFECTS A severe pest–42 percent of the Douglas-fir type on the east side of Region Six is infected Causes extensive mortality on poor sites
CONTROL MEASURES Regenerate mature stands, leave buffers between infected trees and uninfected seedlings, quickly remove infected trees in partial cuts.

Larch Dwarf-Mistletoe (*Arceuthobium laricis*)
TREES AFFECTED Western larch, lodgepole pine and subalpine fir (occasional)
DAMAGE CAUSED Reduced growth, seed output, lumber defect; brooms; mortality
IMPACTS AND EFFECTS Our most serious larch pest – 47 percent of host type in the Northwest is infected Kills trees faster than most dwarf-mistletoes.
CONTROL MEASURES Regenerate mature stands, leave buffers between infected trees and uninfected seedlings, quickly remove infected trees in partial cuts

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Lodgepole Pine Dwarf-Mistletoe (*Arceuthobium americanum*)
TREES AFFECTED Lodgepole pine and ponderosa pine (occasional)
DAMAGE CAUSED Reduced vigor and growth, stem cankers, mortality.
IMPACTS AND EFFECTS Severe–42 percent of host type in Northwest is infected.
CONTROL MEASURES Clearcut mature stands; sanitize young stands by removing infected trees, prompt removal of infected overstory trees in partial cuts.

Western Dwarf-Mistletoe (*Arceuthobium campylopodum*)
TREE AFFECTED. Ponderosa pine
DAMAGE CAUSED Reduced vigor, growth, seed production, cankers, mortality.
IMPACTS AND EFFECTS Common–26 percent of host type in Northwest is infected.
CONTROL MEASURES Regenerate mature stands, sanitize young stands during thinnings, promptly remove infected overstory trees from partial cuts

*** Root Diseases ***

Annosus Root Disease (*Fomes annosus*)

TREES AFFECTED White fir, lodgepole pine, ponderosa pine and subalpine fir.

DAMAGE CAUSED. Butt decay and tree mortality.

IMPACTS AND EFFECTS: Fairly common in mixed-conifer stands, especially those with a history of repeated partial cutting

CONTROL MEASURES Favor tolerant and resistant trees; use short rotations and fewest possible entries, remove infected stumps or treat them with borax while still fresh (immediately after felling)

Armillaria Root Disease (*Armillaria ostoyae*).

TREES AFFECTED Douglas-fir and white fir–severe, pines–moderate

DAMAGE CAUSED. Reduced growth; butt decay; windthrow, tree mortality

IMPACTS AND EFFECTS. Widespread in mixed-conifer stands; probably the most damaging root disease of the Malheur National Forest

CONTROL MEASURES Favor tolerant and resistant trees; avoid frequent entries and wounding, sanitize during thinning, stump removal in special situations

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Black Stain Root Disease (*Ophiostoma wagenerii* var *ponderosum*)

TREES AFFECTED Ponderosa pine and lodgepole pine.

DAMAGE CAUSED Reduced growth and tree mortality

IMPACTS AND EFFECTS. Usually spread by root-feeding bark beetles and weevils, recently found in the ponderosa pine type on Prairie City Ranger District.

CONTROL MEASURES Favor tolerant and resistant species, minimize tree injuries and site disturbance, schedule precommercial thinning to avoid insect vectors

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Laminated Root Rot (*Phellinus weirii*)

TREES AFFECTED: Douglas-fir and white fir–severe, Engelmann spruce, subalpine fir and western larch–moderate

DAMAGE CAUSED Reduced growth, root and butt decay, windthrow; tree mortality

IMPACTS AND EFFECTS Causes heavy mortality on infected sites Can survive for long time periods in infected stumps and roots

CONTROL MEASURES Favor tolerant and resistant species, remove infected stumps from disease centers (only used in special situations like recreation sites)

*** RUSTS and ROTS ***

Comandra Blister Rust (*Cronartium commandre*)

TREES AFFECTED Ponderosa pine and lodgepole pine

DAMAGE CAUSED Kills branches, tops and entire trees

IMPACTS AND EFFECTS: Often minor, but some mortality occurs over small areas

CONTROL MEASURES Favor non-host trees, remove infected trees during thinning, clearcut mature, infected stands

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Indian Paint Fungus (*Echinodontium tinctorium*)

TREE AFFECTED. White fir

DAMAGE CAUSED Stem decay.

IMPACTS AND EFFECTS Widespread in old-growth, mixed-conifer stands, most important stem decay organism on Malheur National Forest.

CONTROL MEASURES Maintain vigorous stands, use short rotations; avoid bole wounding; avoid managing advanced regeneration more than 50 years old

Red Ring Rot (*Phellinus pini*).
TREES AFFECTED Most conifers
DAMAGE CAUSED: Stem decay.
IMPACTS AND EFFECTS Common in old-growth, especially on steep, rocky slopes.
CONTROL MEASURES Salvage infected trees, avoid wounding of host trees, replace old-growth with young, vigorous trees

Western Gall Rust (*Peridermium harknessii*).
TREE AFFECTED Lodgepole pine
DAMAGE CAUSED. Stem deformity, breakage, tree mortality
IMPACTS AND EFFECTS: Widespread in host type, but damage seldom severe except in young stands.
CONTROL MEASURES Remove damaged trees, leave rust-free trees in partial cuts

c *Regional Timber Demand and Supply Projections*

The principal projections used in developing long-range plans and programs for management of the National Forests are contained in the Forest and Rangeland Renewable Resources Planning Act (RPA) Assessment and 1984 Update These projections focus on a long time period (50 years) and do not necessarily recognize short-term, Regional fluctuations A summary of those RPA projections (year 2030) for timber supplies follows

Hardwoods:

The current balance between wood growth and its removal show that the hardwood forests and eastern softwood forests can support additional timber harvests, but this balance will change, and future harvests, particularly in the decades beyond 2000, could vary over a wide range Nonetheless, if commercial timberland owners continue to respond to price and inventory changes, then timber harvests can be increased substantially in most geographic regions during the next few decades The largest hardwood increases will be in the south, which is expected to rise from about 3 4 billion cubic feet in 1980 to 9 4 billion in 2030 (RPA 1984)

Softwoods:

Total softwood harvests would rise 24 percent from 9 6 billion cubic feet in 1980 to 11 9 billion cubic feet in 2030 Though the outlook is for increased softwood harvests nationally, there are important differences among the major softwood- producing regions.

In the Douglas-fir subregion, projected annual harvest from 1980 to 1990 is about 2.3 billion cubic feet It then declines slightly to about 2 billion cubic feet per year This level is maintained through the rest of the 50-year projection period (RPA 1984)

In contrast, the other major source of softwood timber is the south Harvest level is projected to rise from about 4 1 billion cubic feet in 1980 to 7 3 billion in 2030. However, many recent forecasts are now showing a downward trend in the rate of economic supply. This may indicate that the south could be expected to shift to a slower growth rate until the year 2030 Much of the current expansion in the south with softwoods, as well as hardwoods, is due to the fact that its production of wood products has become more diversified as compared to other regions of the country

d *Short-Term and Long-Term Demand Trends*

Over the next 10 years, timber demand from the Pacific Northwest geographic region will grow slowly Although there is a backlog of unfulfilled housing demand, the future will depend primarily on continuing strength in personal income and the availability of affordable housing and financing In addition, export projections for Pacific Rim countries show stable or declining economic growth. The analysis acknowledges there will be a decline in the construction sector. Structure replacement, rather than new construction, will characterize their market. The projections for demand increases may be described as considerably restrained and cautious (Nomura 1981).

The long-term outlook for solid wood-products industries contains a number of challenges Evaluation of recent information indicates that timber demand is showing a strong increase when compared with the slowdown of the early 1980's.

The ability to sustain this increase over a long time period is linked to the critical issue of costs The long-term trends in housing demand, the growing popularity of construction methods that use less wood, availability of wood substitutes, and a shift in business management strategies and methods, all contribute to a potential shift in future demand (Adams and Haynes 1985).

Wood supply will continue to be an issue in the sense that it will be highly dependent on the ability of producers to lower their costs in order to compete with wood substitutes (Schallau 1985 and 1986)

Although current timber supply levels in the Pacific Northwest Region may be capable of meeting future demand, there are some problems within the subregional market areas. This needs to be recognized in terms of a shifting of industry within the Region and also in the shifting emphasis on the types of wood products produced, as well as the ability of the subregion to supply the various kinds of wood needed

A vision of the future that features stable wood supplies and a progressive perspective on wood fiber management would allow the Pacific Northwest Region to grasp an opportunity to increase exports to international markets To achieve this, the forest products industry will need to learn a different market system and provide more products in the form demanded (Campbell, 1983). In addition, actions by industry, such as modernizing facilities, adopting current technology, reducing costs, and diversifying into other production sectors (similar to what the southern region has done) could help revitalize the wood- based sectors of the region (Schallau 1985).

e. *Private and Public Land Interrelationships*

Currently, part of the timber formerly supplied by the Pacific Northwest Region is now being supplied by the south and Canada However, the situation with Canada can be expected to change as there are indications that economic supplies may begin dropping off within 6 to 15 years The projected change indicates a potential drop in supply capability of 30 to 50 percent from current levels The south should be able to maintain harvests, or show a slow increase, because of its remaining inventory and some substitution of hardwoods. However, both the economic and physical supply of softwoods from that area may begin to show a decline by year 2030

At about the same time this drop in supply capability begins to occur for other sources, the growth of wood fiber on private lands in the Pacific Northwest would again be reaching its capability. Private lands in the Pacific Northwest could then become a major softwood supply source to meet national and international demand. Further, during the period before the private lands in the region regain their full supply potential, the public forests would be looked upon as a major source for a relatively stable supply of wood fiber (Schallau 1985)

f. *Projections for Forest Supply and Demand*

The following discussion includes supply and demand projections to the year 2018. Projections beyond this time were not undertaken because of unreliable information and probable revision of the Forest Plan and policies prior to that period

Theoretical supply levels have been calculated for the Forest. The supply potential under *varying management strategies was presented in the Forest's Analysis of the Management* Situation (AMS) Current management direction would result in a potential supply of about 45 million cubic feet annually through 2018; a high-investment strategy (modeled in FORPLAN) could generate an annual supply of about 50 million cubic feet through 2018. Important assumptions underlying these supply projections are. 1) many of the Forest's two-storied stands have a manageable understory, and 2) the species composition of the raw material supplied by the Forest will change from mostly ponderosa pine to mixed conifer This change will occur due to faster potential growth rates in mixed conifer stands, enabling higher annual timber harvests; and 3) conversion ratios to board foot volumes have no effect on supply/demand projections No attempt has been made to account for varying board foot/cubic foot conversion ratios that will be realized in future years

There are three major influences on the potential supply level the number of acres available for harvest, the intensity of management on those acres, and the harvest flow schedule (nondeclining flow or departure) Acreage available is the most significant influence, since large changes in standing timber volume are directly related to land management Departure from nondeclining flow can increase harvest levels temporarily, but entails a decrease sometime in the future. Intensive timber management practices influence the supply level by affecting the growth rate of trees The most effective practices for increasing growth are planting improved stock (genetics) and stocking-level control (precommercial thinning)

In recent years (1980-87), an average of 248 million board feet of National Forest timber has been harvested annually (includes Umatilla and Ochoco National Forests harvests within Grant and Harney counties, based on Oregon State Department of Forestry Annual Harvest Reports) Six major sawmills are presently located within the Forest's zone of influence and several sawmills in adjacent counties purchase Malheur National Forest timber (varying levels) To put the Forest supply potential in the context of its relationship to the timber industry in the Forest's zone of influence, the entire timber supply picture must be considered In the past and at present, demand for wood products has been the primary determinant of the health of the local timber industry; the raw material supply has been abundant and supported the industry However, an important concern is the continued supply of raw material for the timber industry Enough is known about current stand conditions to draw some general conclusions about future supply trends Table III-4 summarizes current conditions on timber lands in the Forest zone of influence.

As displayed in Table III-4, the National Forests (Malheur, Umatilla, and Ochoco) contain most of the forest land (and correspondingly, the standing timber inventory) in Grant and Harney Counties Although there are other sources of supply locally (private or industrial landholdings), the most desirable material (based on size and density of material) is currently located on the National Forests In Table III-5, projections are displayed for *potential timber harvests on lands other than National Forests Also displayed are past* harvests over the recent 17 years In recent years, the volume harvested from the National Forests has been proportional to the relative amount of forest land. (National Forest harvests have run about 83-90 percent of total harvest from all sources, compares with National Forests comprising 87 percent of all forest land in the counties.)

Presently, the potential supply of Malheur National Forest timber and other wood fiber exceeds recent harvest levels from the Forest (1980-87 average) But there have been pressures from local and outside sources to increase timber sale levels so they approach the Forest's potential supply level Therefore, it can be assumed that there will be a demand increase for products from the Malheur National Forest With this increased interest from local and outside sources, it can be assumed that all volume offered for sale by the Forest will be purchased

TABLE III-4: Timber Stand Conditions, Grant and Harney Counties1/

Ownership Class	Forest Land Acres (1,000)	Percent of Total	Stand Conditions
National Forest2/	1,752	87.2	Relative abundance of large sawtimber stands (over 50 percent of commercial acreage).
Bureau of Land Management (BLM) and Others	50	2 5	Some holdings include substantial amounts of large sawtimber (BLM). However, other public lands (State) have been cut over or are of marginal quality
Forest Industry	100	5.0	Very small holdings of large sawtimber remain (about 7 percent). Most holdings range from small sawtimber to advanced reproduction stages.
Other Private	103	5.1	Some holdings of suitable growth are presently available; however, management practices are highly variable, as are stand conditions.

1/ Consolidated from several Forest Service and State of Oregon supply studies, and personal knowledge of industrial specialists

2/ Includes Ochoco and Umatilla National Forest land in Grant and Harney Counties Also, assumes small portions of the Malheur National Forest in other counties (Malheur, Baker, etc) which have no effect Similarly, a small portion of the Wallowa-Whitman National Forest in the Malheur National Forest zone of influence counties is not considered

TABLE III-5: Projected Potential Timber Harvest, Grant and Harney Counties
(Harvest In Million Board Feet Per Year)

Period	BLM & Other Public	Forest Industry	Other Private	Total Non National Forest	National1/ Forest	Total
1970 - 19792/	5	22	15	42	282	324
1980 - 19872/	2	12	14	28	248	276
1989 - 1998	4	15	15	34	3/	
1999 - 2008	4	15	15	34	3/	
2009 - 2018	5	15	10	30	3/	

1/ National Forest harvests in Grant and Harney Counties were generated from the Malheur, Umatilla, and Ochoco National Forests

2/ Historical harvest information obtained from Oregon State Department of Forestry Annual Harvest Reports

3/ Projected harvests in these periods from National Forest are analyzed by alternative in Chapter IV under Effects on Cumulative Timber Supply

Several conclusions can be drawn from the preceding discussion and tables Perhaps foremost, the timber industry in Grant and Harney Counties has been, and will continue to be, extremely dependent upon timber supplies from the Malheur National Forest Secondly, adjacent National Forests in Grant and Harney Counties have an important role in the overall supply of timber in the Malheur's zone of influence, and must be considered. Because of the Forest's dominant supply position, the timber industry must adapt to changes in National Forest supply (changes in size or species offered) unilaterally, with no apparent way to generate other sources of raw material Finally, the actions of National Forests outside the Forest's zone of influence could result in demand changes for timber supplies in Grant and Harney Counties

The demand pattern for Malheur National Forest timber, while not as complex as other National Forests, is contingent upon several factors Included are (1) the product demand of local timber industry, which is fairly reflective of the national market, (2) the supply actions of adjacent National Forests (i e , their timber harvest levels), and (3) to a lesser degree, the supply actions of other forest landholders in Grant and Harney Counties

In recent years, harvest levels of National Forest timber in the Forest's zone of influence have been quite variable As shown in Table III-5, the average annual timber harvest level dropped 12 percent in the period 1980-87 when compared to 1970-79 average annual harvests The periods of comparison reflect two different states in the timber industry The earlier period, 1970-79, was a time of substantial inflation, speculation, and growth. Demand for raw material was strong, prices were generally reflective of strong demand, accompanied by speculation that inflation would continue The latter period, however, included some mill closures and a severe slump in the housing construction market (but in recent years, the market has staged a substantial recovery)

Although an attempt to quantify the future demand for Forest timber is highly uncertain, such an estimate is useful for relating alternative Malheur National Forest harvest levels to the overall supply/demand situation in Grant and Harney Counties Therefore, projections were made of the possible demand range for National Forest timber in future decades (see Table III-6) Demand projections are based on the following assumptions·

a Historically, the timber industry has been cyclical For prediction purposes in this analysis, the harvest level during the 1980-87 period is assumed to be the lower bound of probable future demand and the harvest level during the 1970-79 period is assumed to be the upper bound of probable future demand

b Demand in the 1990-99 period will gradually increase (from the 1980-87 level) to a point 50 to 100 percent of the range between the low and high demand levels developed above (i e , an increase of 24 to 48 million board feet) This reflects continuing recovery of timber demand, as exhibited by annual harvests from 1984 to 1987, in the local and regional area From 2000 on, demand will continue to grow at a rate of 3 to 5 percent per period through the year 2019 (the end of the analysis period) This growth in demand for products from the Forest is expected to be driven by growth in industry and technology, and potential reductions in supply sources adjacent to the Forest's zone of influence

c Demand for National Forest timber can be projected by subtracting estimated non-National Forest harvest from estimated demand for final products In this context, "demand" is defined as the volume of available National Forest timber that would be purchased by mills in response to demand for final products, and supply of timber from other sources

d. Portions of the demand for National Forest timber in Grant and Harney counties' zone of influence will be supplied from the Umatilla and Ochoco National Forests The portions supplied from these Forests will be based on their current annual harvest levels, and no increases in harvest levels over time will be assumed. Each Forest's contribution will be proportional to its ratio of acres within the zone of influence.

TABLE III-6: Projected Demand for National Forest Timber
(Million B.F Per Year)

Time Period	Estimated Total Demand	Non-National Forest Harvest	Demand for National Forest Timber
1990 - 1999	300 - 348	20 - 40	280 - 328
2000 - 2009	309 - 365	20 - 40	289 - 345
2010 - 2019	318 - 383	20 - 40	298 - 363

The projections given above represent estimates of the timber volume that would be purchased if it were available Assuming a relatively stable flow of timber from National Forest sources (as specified in the existing Timber Resource Management Plans), the interaction of current and projected demand with estimated future supplies may result in additional market pressure on the Forest The pressure may be expressed as demand on the Malheur National Forest to increase timber supplies.

Refer to "Effects on Cumulative Timber Supply" in Chapter IV for a complete comparison of the timber supply by individual alternatives, and more analysis of probable supply/demand interactions in the local area.

g *Efficiency of Forest Timber Program*

Overall efficiency of the Malheur National Forest timber sale program is very favorable, with a substantial net cash flow However, even with a positive cash flow overall, there are some individual timber sales that cost more to prepare, sell, and administer than is returned to the Treasury from that sale These sales are usually small or have a large volume of low-value products, such as lodgepole pine or cull logs Examples of such sales are post and pole sales, firewood sales, small salvage sales, wood fiber sales, and small commercial thinnings There are also benefits which result from these sales, such as the improved vigor and increased growth of trees remaining after commercial thinning, the salvage of insect-killed trees, or the value of providing a labor-intensive product like posts and poles

Timber value on a particular sale is primarily determined by the species present and the size of the logs. Species such as ponderosa pine have historically had much more value than species such as Douglas-fir and white fir Larger trees are more valuable than smaller trees because they produce a higher percentage of clear wood (free from defects like knots)

The costs related to a particular timber sale can vary widely Factors that affect costs include roading, logging system alternatives, harvest unit size and shape, volume per acre, distance from a manufacturing facility, environmental constraints, and mitigation measures. These factors affect the appraised value, which is the minimum that the Government will accept for a sale when it is sold.

A review of timber sale costs and receipts for the period from 1979 through 1985 (Table III-7) reveals that the Forest had a positive cash flow in each of those years from the sale of National Forest timber Table III-7 displays the volumes and value of timber sold during 1979-1985 in the first two columns The second two columns display the volume and value of timber harvested during those same years Timber harvested was generally sold in previous years. The last column displays costs of the timber sale program during each of those years, excluding road costs which are shown in Figure III-10.

Some argue that the cost of permanent roads built in conjunction with a particular sale should be charged against the value of the timber in that sale. Others argue that these roads are a capital investment and their cost should be assigned to all timber sales that will utilize the road in the future Roads are often considered a long-term asset, not a short-term cost, because their objective is to provide access for several cycles of management activity Roads also increase access for administration of other programs, for Forest protection, and for Forest users

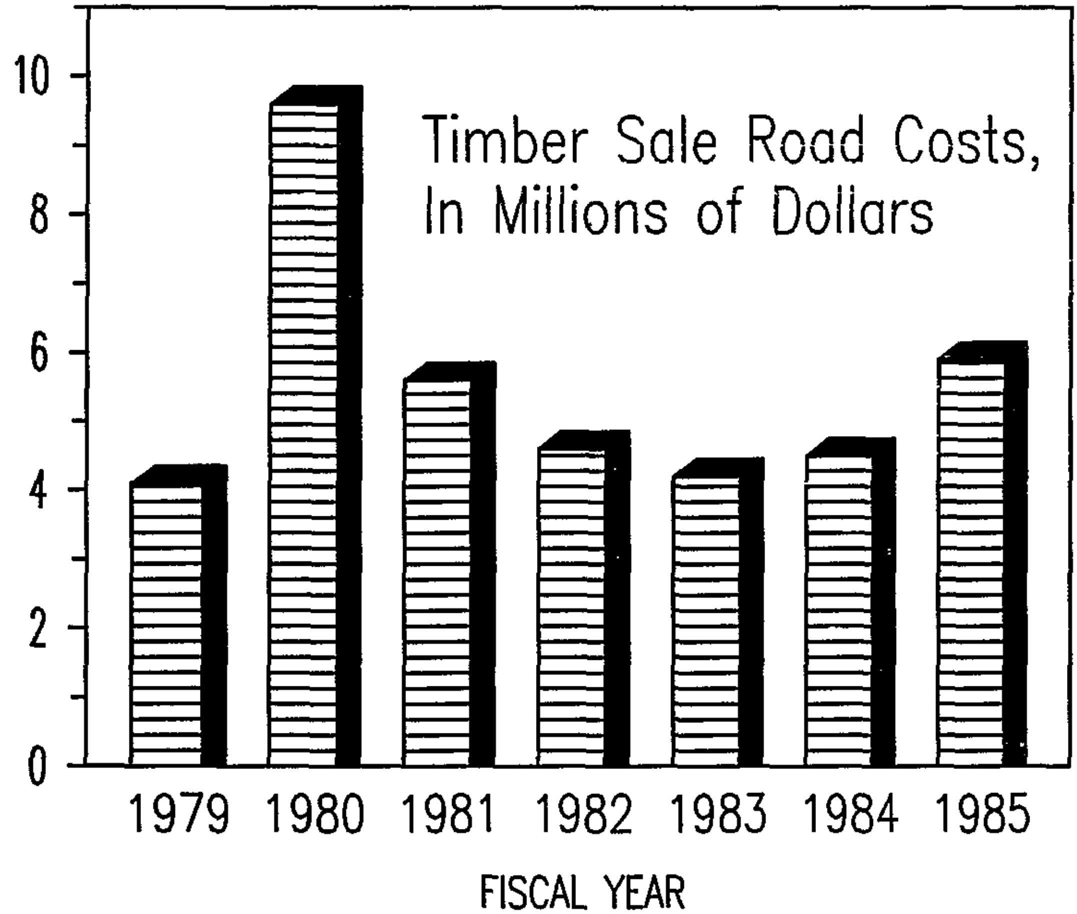
In the sale appraisal process, timber value is reduced by the estimated cost of permanent road development It would be inappropriate to consider road construction as a sale cost without incorporating road benefits as a sale value If road construction is considered a cost rather than an asset (see fig III-10), the timber program produces positive cash flows for four of the seven years.

For example, the Forest's 1985 timber sale program cost $5,577,000, the value of the timber harvest was $28,362,000. This was a positive return of $22,785,000 If road construction was added to timber sale program costs, the total annual cost was $11,485,000 In that instance, there would have been a positive cash flow of $16,877,000 for the 1985 sale program

TABLE III-7: Timber Sale Costs and Receipts

	Timber Sold		Timber Harvested		Program Cost
Fiscal Year	Program Sell Volume (Million Board Feet)	Program Sell Receipts (Million Dollars)	Harvest Volume (Million Board Feet)	Harvest Recripts (Million Dollars)	Net Timber Program Volume Program Volume Cost Before Road Costs (Million Dollars)
1979	162	26 454	178	22 152	2 693
1980	223	22 307	104	10 008	2.986
1981	206	23 204	83	5.030	3 797
1982	177	9.880	73	5.104	3.722
1983	197	18 247	151	9 011	3 208
1984	238	26 481	205	20 071	5.284
1985	220	20.679	264	28.362	5 577

FIGURE III-10: Timber Sale Road Costs



Further analysis work done in 1987 and 1988 showed that the Forest had net receipts of 19.8 million dollars from its 1987 timber program. The analysis also showed a present net value of 4 7 million dollars for future activities on the same acres, when future management activities were considered (1987, Timber Sale Program Information Reporting System, Malheur National Forest) These two analyses indicate that present and future management activities will continue to provide positive returns from the Forest's timber program

h *Relationship Between Forest Management and Trees*

The most obvious effects of timber management activities are on trees As the Forest's Allowable Sale Quantity increases, the area of trees being managed also increases. Some important effects include changes in the age-class diversity of trees, the vigor and growth of remaining trees, and the tree species present.

Intensive timber management includes many different activities, including the use of herbicides, prescribed fire, fertilization, precommercial thinning, and others (Pacific Northwest Region, 1981, and Pacific Northwest Regional Guide) Herbicide use on the Forest has not been widespread in the past; its use is expected to decline in the future There should be little or no effect on intensive timber management if herbicide use is not allowed in the future Thinning and other cultural practices create stands of healthy, rapidly-growing trees which are fairly resistant to insects and disease. Intensively-managed stands of ponderosa pine and lodgepole pine have few risks from insects and diseases White fir and Douglas-fir are more resistant to insects and diseases when intensively managed, although they remain more susceptible than the pines

Silvicultural systems which harvest the mature timber and then start a new stand (clearcuts and shelterwoods) tend to retain the current species mix now found on the Forest (50 percent ponderosa pine volume, 50 percent mixed-conifer volume) Silvicultural systems which harvest the mature trees and then manage the existing understory result in a shift to the potentially faster-growing fir species (70 percent mixed-conifer volume and 30 percent ponderosa pine volume) after 30 years Depending on how the stand is regenerated, the species mix usually returns to the current 50/50 volume mix on a Forest-wide basis There will be a change in age-class distribution under both of these systems Existing stands being regenerated will change from 150 years (and older) to trees up to 10 years of age. When an overstory removal occurs and the existing understory is managed, the resulting stand will average about 90 years old. Under either silvicultural system described above, there will be a change in harvest diameters Harvest diameters will have decreased from around 24 inches in 1980 (20-22 inches diameter in 1990) to approximately 15 inches after about forty years.

The most significant effect on old-growth trees is the harvest of mature, two- storied stands on the Forest. This reduces the acreage of both existing and potential old-growth trees

Riparian areas are stream-oriented, variable-width corridors Riparian areas of Class I, II and III streams comprise about 4 percent of the Forest Management of these areas typically involves practices which minimize disturbance, perpetuate tree cover, and provide large-diameter trees for fish and wildlife objectives This management scheme favors shade-tolerant species like fir, which will become prevalent over time Brush and hardwoods also tend to increase over time.

In certain areas like wilderness, timber management will not occur and trees progress gradually through several stages of natural succession unless interrupted by a fire, insect epidemic, or windstorm These areas often have diverse, multistoried vegetation with large, old trees, interspersed with openings There is often a gradual change from ponderosa pine to mixed-conifer species in areas where pine is not the climax species

There is also an effect on trees in developed recreation areas Dangerous, diseased trees are removed for the safety of recreationists Soil can be compacted and eroded in developed sites, which exposes tree roots and affects tree vigor Concentrated recreation use reduces or eliminates vegetative ground cover

The effect of cultural resource management on trees is related to its effect on timber management When a cultural resource site is avoided, the trees and other vegetation around it remain in their natural state and continue through natural succession. Other measures which reduce impacts to cultural resources (such as designated skid trails, over-the-snow logging, or directional felling) may also reduce damage to residual vegetation.

Road surfaces eliminate land from timber production Currently, 26,721 acres of the Forest are dedicated to road use.

Mining may also temporarily remove lands from timber production because a mining claimant has a statutory right to mine, to clear land for mining purposes, and to use the timber from the claim area to support mineral development

Areas managed for scenic quality would receive specific vegetative treatments to improve or maintain existing visual conditions These treatments would generally include individual tree selection or group selection harvests This will improve the vigor of remaining trees Age classes of trees in visual corridors will be very diverse There will be about five large-diameter trees per acre which will gradually die and provide snag habitat There will be some increased potential for mistletoe and root rot, especially in mixed-conifer stands

Areas managed for roaded natural recreation would receive specific vegetative treatments designed to improve or maintain existing visual conditions for viewing from a motor vehicle. These treatments would generally include standard timber harvest procedures, but with extended rotations to produce the desired sizes and numbers of trees (50 percent of the stand will be 24 inches in diameter or greater before final harvest could occur). Tree vigor increases early in the rotation and then declines slightly in latter years – ponderosa pine stands retain 90 percent of their full growth potential at 140 years, whereas mixed-conifer stands would probably fall below that level in the same time period

2. Forage

The Forest is not a continuous landscape of trees, forested areas are interspersed with meadows, openings around springs and along streams, and dry, juniper/ bunchgrass and sagebrush-covered hillsides These nonforest areas comprise about 20 percent of the Malheur National Forest.

Rangelands provide habitat and food for many species of wildlife, both game and nongame, and currently support a summer population of about 6,600elk on the Forest. They also provide scenic diversity and are the most productive grazing land for livestock, which is important to the social and economic welfare of local communities

Forested areas at all elevations furnish summer range for cattle and big game The forage yields from these areas depend on density of the tree canopy. Low-elevation areas are used as winter range by Rocky Mountain elk, mule deer, and wild horses (see discussion of wildlife)

The most extensive and valuable forested community for livestock grazing is ponderosa pine In prime condition, it is an open forest which produces considerable green forage with good protein content during the hot season. Because of this, the ponderosa pine/bunchgrass type is more valuable than low-elevation bunchgrass range late in the grazing season. Livestock grazing has been heavy for many years in ponderosa pine forests and on the interspersed openings, meadows, and streamside zones which cattle favor.

a *Land Classification*

The Forest produces forage from a land base of 1,459,422 acres Of these, 1,351,255 acres are available for cattle grazing. Forest lands not available for cattle grazing include:

a. Original Strawberry Mountain Wilderness, 33,000 acres
b. Long Creek and Canyon City Municipal Watershed, 610 acres
c Administrative Sites, 607 acres
d Roads, 26,721 acres
e. Water (outside Wilderness), 112 acres
f Not included in grazing allotments, 35,445 acres
g Rockland, 11,672 acres

b. *Livestock Use of Forage*

Suitable rangelands on the Forest need uniform grazing distribution to maintain long-term productivity. Proper stocking rates, effective grazing systems, water development, fencing, vegetation treatment, and permittee cooperation are important parts of an overall management plan which improves livestock distribution

Currently about 25,000 cow/calf pairs graze on the Forest during late spring, summer, and early fall. Most of the cattle operations using the Malheur National Forest are commercial cow and calf operations The average grazing permit is 150 cow/calf pairs. Grazing permits supply summer forage for those livestock operations. Approximately two-thirds of a brood cow's yearly diet is from grazed forage. During the winter months, cattle are fed hay produced on irrigated lands Further discussion about the livestock industry can be found in the "Social and Economic Setting" portion of this chapter.